

---

---

**IOWA UTILITIES BOARD**  
**Energy Section**

Docket No.: NOI-2008-0003  
Utility: Multiple  
Memo Date: December 27, 2013

**TO:** The Board

**FROM:** Smart Grid Team  
Parveen Baig (Team Leader)  
Brenda Biddle  
Dan Fritz  
Vincent Hanrahan  
Barb Oswalt  
Ellen Shaw  
Gary Stump  
Jim Sundermeyer  
Jane Whetstone

**SUBJECT:** Smart Grid Deployment – Needs Board Order Accepting Inquiry  
Participants Comments and Continuing the Inquiry

**I. Background**

Docket No. NOI-2008-0003 was initiated in response to the requirements of the Energy Independence and Security Act of 2007 (EISA). On March 9, 2010, the Board issued an order that expanded the inquiry to include smart grid deployment in Iowa. Since the inquiry was opened, two workshops have been held on August 24, 2009, and April 16, 2010. After the second workshop, additional comments from participants were received on May 10, 2010.

On November 19, 2010, and May 16, 2011, staff submitted memos to the Board summarizing the various activities staff had been monitoring related to smart grid deployment in Iowa and other states. Staff submitted a memo to the Board on October 6, 2011, recommending that the Board issue an order directing Iowa utilities and other interested parties to file responses to questions contained in the memo. On October 14, 2011, the Board issued an “Order Soliciting Comments” which contained specific questions related to both smart grid and aggregators of retail customers (ARCs). On April 30, 2012, staff submitted a memo to the Board summarizing the responses to the October 14, 2011, Board order. On June 25, 2012, the Board issued an order that discussed the April 30, 2012, staff memorandum that, among other things, contained an overview of activities and technological advances on various smart grid

projects Iowa utilities were undertaking.<sup>1</sup> The Board order also stated that in addition to the Board's monitoring of smart grid developments, approximately each year the Board will evaluate smart grid developments and inquiry participants will be notified if the Board solicits additional information.

On October 18, 2013, the Board issued an order requiring additional information from inquiry participants. The order stated that an update of utilities' activities and other participants' comments on current smart grid issues will be helpful so that all participants and the Board have a common knowledge base to determine whether additional smart grid initiatives would provide value to utility customers. In the last staff report, a common theme throughout the comments was the importance of focusing on the balance between customer value and cost. On November 15, 2013, initial comments were filed by MidAmerican Energy Company (MidAmerican), Interstate Power and Light Company (IPL), Iowa Association of Electric Cooperative (IAEC), Iowa Association of Municipal Utilities (IAMU). Office of Consumer Advocate (OCA) filed a letter indicating they did not have any initial comments. No reply comments were filed by participants.

## **II. Staff Analysis**

The information request in the October 18, 2013, order was open-ended and participants were encouraged to address smart grid issues that have arisen since the last time comments were filed in 2012. Appendix A to this memo summarizes the comments.

MidAmerican provided information on two projects, Synchrophasor project and Opower project as required by the Board order issued on October 18, 2013.

IPL provided a general discussion of its Smart Grid Strategic Roadmap (Roadmap), a brief discussion of its Oracle Customer Care and Billing system, web-based interface-PeakMap™, IPL's participation in several Electric Power Research Institute (EPRI) programs, and IBM/City of Dubuque Smarter Electricity Project.

The IAMU filing contained three parts. First, IAMU provided an update of the Smart Grid Investment Grant (SGIG) project and the status of two time-of-use rate projects. Second, IAMU discussed its members' smart grid projects. IAMU believes this discussion does not include all smart grid projects. Third, IAMU provided comments on smart grid infrastructure deployment under emerging market conditions.

IAEC provided an update of meter replacement (Advanced Metering Infrastructure (AMI)) programs undertaken by ten member cooperatives. IAEC stated that other members of the IAEC have also been working on meter upgrade efforts. In 2007, IAEC began an effort of providing policy makers, the media, and other stakeholders

---

<sup>1</sup> The Board order also extended the prohibition of ARCs from operating in Iowa and extended the prohibition on retail customers or third-party ARCs from transferring demand response load reductions in Midcontinent Independent System Operator markets.

information through a Web-based outage map. The Web-based outage map now includes a Google-based map with the capability of displaying a weather overlay.

**The comments provided an overview of Iowa utilities' current activity related to smart grid deployment. IPL sees distribution system enhancements as leading smart grid opportunities. Municipal utilities are considering dynamic pricing. Cooperatives are investing in advanced metering infrastructure.**

Staff plans to continue monitoring smart grid developments and plans to provide the Board with an update in approximately one year.

### **III. Staff Recommendation**

Staff recommends that the Board direct General Counsel to draft an order for the Board's consideration notifying the parties that the Board appreciates the input provided in their comments and indicating that the Board intends to continue monitoring smart grid activities nationally and in Iowa and if circumstances warrant, the Board might seek additional comments on smart grid issues from stakeholders in the future.

#### **RECOMMENDATION APPROVED**

#### **IOWA UTILITIES BOARD**

<u>/s/ Elizabeth S. Jacobs</u>	<u>1-7-14</u>
	Date
<u>/s/ Nick Wagner</u>	<u>1/2/14</u>
	Date
<u>/s/ Sheila K. Tipton</u>	<u>12/30/2013</u>
	Date

/pb

## **Appendix A**

### **MidAmerican Energy Company (MidAmerican)**

MidAmerican provided information on two projects as required by the Board order issued on October 18, 2013.

#### Synchrophasor Project

MidAmerican has installed a system of phasor measurement units (PMU) and related devices in its service territory as part of a project funded by the Midcontinent Independent System Operator, Inc. (MISO) through a Smart Grid Investment Grant (SGIG) from the U.S. Department of Energy (DOE). The purpose of the project is to improve the dispatch of energy, system reliability, and planning capabilities by strategically deploying PMUs and phasor data concentrators (PDCs) across the Midwest which will help further develop smart grid functions. The PMU measurements will enable advanced monitoring and analysis to identify grid conditions and the data will feed applications that allow grid operators to understand real-time grid conditions, detect changing conditions, and better diagnose, implement, and evaluate remedial actions to protect the system. The project will also assist in the reliable dispatch of renewable energy resources.

MidAmerican has installed, tested, and integrated 15 PMUs, a primary PDC, and a backup PDC. Communication infrastructure has been installed to provide real-time PMU data to MISO. MISO shares data and related research information with MidAmerican through weekly emails. To date, MISO has reimbursed MidAmerican for 12 of the 15 PMUs and both PDCs. MidAmerican expects to be fully reimbursement for the project.

MidAmerican also receives daily updates on the PMUs availability and can view real-time and archived data through MISO Applications. The PMUs are not currently used for real time data for MidAmerican operators but are used for reviewing and analyzing system events after the fact and for information on the system at the time of an event.

#### Home Energy Report (OPower)

In November of 2011, MidAmerican began its Home Energy Report pilot program which is intended to facilitate energy savings through behavior modification strategies. The pilot program included approximately 50,000 combination service residential Iowa customers who would receive six Home Energy Reports by mail during the year and have access to a customer Web portal.

As of September 30, 2013, there were 41,542 active customers in the pilot with approximately 4,200 visiting the Web portal. The number of customers has declined

because some customers moved during the program period and 335 customers chose to opt-out of the program. The cumulative opt-out rate for the program is 0.7 percent. Through September 30, 2013, the program has realized 179,973,000 kWh of electric energy savings (1.7 percent of customer kWh usage) and 694,365 therms of natural gas savings (1.0 percent of total customer therm usage). The estimated customer bill savings was \$1,513,307 for electric and \$630,761 for natural gas.

MidAmerican has made several changes to the program based on customer feedback. Initially, the reports said customers were compared to 100 similarly-situated “neighbors” but the word “neighbor” caused confusion and was changed to “similar homes.” MidAmerican’s Quality Department responded to customers’ concerns by explaining the purpose of the program and updating the customer’s profile. Some customers have expressed gratitude for the reports and tips and have shared the energy efficiency improvements they have made with MidAmerican’s Customer Service Associates.

For its 2014-2018 Energy Efficiency plan MidAmerican plans to expand the Home Energy Report program to approximately 170,000 participants and add a Home Energy Report component for 20,000 customers in its Low-Income program.

### **Interstate Power & Light Company (IPL)**

IPL provided a general discussion of its Smart Grid Strategic Roadmap (Roadmap), and brief discussion of its Oracle Customer Care and Billing system, Web-based interface-PeakMap™, IPL’s participation in several Electric Power Research Institute (EPRI) programs, and IBM/City of Dubuque Smarter Electricity Project.

#### **Smart Grid**

IPL’s vision for smart grid is evolving through experiences and insights gained through other utilities’ deployment of various technologies, including IPL’s sister utility Wisconsin Power and Light Company. IPL developed its Roadmap in 2010 with assistance from IBM and is in the process of updating the Roadmap to reflect the emerging issues, new technologies, and changing business needs. The revised Roadmap is expected to be completed by the end of 2013 but IPL still plans to develop and implement its new Oracle Customer Care and Billing system (2015 timeframe) prior to consideration of installing Automated Metering Infrastructure (AMI). Currently IPL has no specific timeline for installing AMI technology.

It is expected that IPL’s new Oracle Customer Care and Billing system will mitigate serious and ongoing risks associated with aging support systems now being used and reduce risks associated with the large number of secondary billing processes. The new system will enhance customer service by providing customizable tools to manage accounts, bill payments, and communication preferences. It will also provide more efficient compliance with Sarbanes-Oxley regulations and other financial reporting

requirements, improve critical billing processes to increase efficiency, reduce risk of error, and improve customer support.

IPL is focusing on the development of a new strategy for enhancing distribution grid monitoring and control. Many of IPL's substations do not currently have remote Supervisory Control and Data Acquisitions (SCADA) capabilities. However, technological advancements in grid monitoring technologies have significantly expanded the available options that can be cost effectively deployed, even for small substations in remote areas. IPL's multi-faceted approach seeks to leverage these new technologies to achieve those monitoring capabilities for substations over a 5 to 10 year period. IPL's continued engagement in EPRI research programs, including *P161-IntelliGrid*, provide useful guidance to execute this strategy. Participation in EPRI P180F-Grid Modernization provides guidelines and tools to understand benefits and costs associated with innovative approaches to applying Smart Distribution solutions.

IPL and other utilities are using information technology and telecommunications infrastructures to maintain the reliability and security of the grid. Therefore, cyber and physical security and data privacy are critical priorities for IPL. IPL's parent company Alliant Energy Corporation (AEC) created a Business Infrastructure and Technology organization to help align and focus resources and responsibilities related to Information Technology, NERC-Critical Infrastructure Protection, Infrastructure and Cyber Security, Business Continuity, Facilities, Crisis Management, and Risk Management. AEC joined EPRI's P183-Cyber Security and Data Privacy research program which is intended to address the emerging threats to an interconnected electric system through a cross-sector collaborative approach on cyber security standards, business processes, and technology to protect the electric grid. This program will also research and develop technologies, best practices, and controls on data privacy for the electric grid.

#### Web-based Interface with Industrial Customers

IPL has a Web-based interface, PeakMap™, for large electric retail and wholesale customers to analyze their 15-minute interval load data. Currently there are about 200 IPL customers using this service with 40 of them using it on a regular basis.

PeakMap makes it easier for customers to take advantage of more favorable rates and make informed energy procurement decisions; pursue bulk purchasing and aggregation opportunities; allocate costs to individual products or processes; and fine tune equipment operation and startup schedules to reduce or eliminate peak demand. IPL staff can use PeakMap to review and analyze customers' interval data and help customers reduce or manage their energy costs more effectively. PeakMap provides customers with more options and is less costly for IPL since little billing staff time is required to support this service. PeakMap does not support providing such information to IPL's other customer classes. IPL envisions that the Oracle Customer Care and Billing project will include the self-service functionality of PeakMap for all customer

classes. Eventually large customers will be moved to the new system and PeakMap will be retired.

#### IBM/City of Dubuque Smarter Electricity Project

IPL supported the IBM/City of Dubuque “Smarter Electricity Project” by installing approximately 1,000 residential AMI meters but the AMI data from these meters have not been used by IPL for billing purposes. This project formally ended in early 2012. The electricity portal used in the project was maintained until October 15, 2013. IBM drafted a “Lessons Learned” document that summarized how the pilot enabled participants to reduce energy consumption and noted that active portal users saved three times the rate of non-active uses. The document also noted that the electricity portal increased participants’ understanding of their electricity use, helped reinforce what they were already doing to save electricity, and felt the portal helped them conserve electricity.

The AMI meters will remain in service as standard billing meters but the deployment of additional AMI meters to IPL customers is on hold, subject to a variety of factors, including enhanced business case development, completion of the Customer Care and Billing project, and timing of other potential significant infrastructure investments.

#### **Iowa Association of Municipal Utilities (IAMU) Comments**

The IAMU filing contains three parts. First, IAMU provided an update of the SGIG project from the DOE grant and status of two time-of-use rate projects. Second, IAMU discussed its members’ smart grid projects known to IAMU. Third, IAMU provided comments on smart grid infrastructure deployment under emerging market conditions.

On April 1, 2010, IAMU received a \$5 million grant for a smart thermostat program entitled 2 Degree 2 Save™, where the utility can ramp up the thermostat by up to two degrees over the course of a load control event and pre-cool by two degrees to achieve a load reduction of approximately 2 kW per thermostat. The grant also funded the installation of AMI. The implementation phase of the project is set to end at the beginning of 2014. The reporting period will continue through 2015. There are currently seven Iowa participants in the project. One participant is located in Kansas. Six of the participants have installed smart thermostats and one has installed switches on air conditioner compressors. There was significant attrition among the original 75 municipal utilities in three states that had provided letters of support /interest for the grant filing. Reasons varied widely among the utilities choosing not to participate. IAMU believes that the cost benefit analysis justifies participation in the project. The grant funded 40 percent of full AMI deployment in Algona and Maquoketa and significant pilot projects in Cedar Falls and Atlantic, including self-healing wireless data collection networks. It was anticipated that some of the participants would install AMI and utilize the ZigBee wireless protocol to control thermostats via signals sent to the smart meter. But communications over a two way network using ZigBee never

materialized, so the thermostats are controlled over a one-way communication system using 900 MHz paging. After resolving problems with defective switches and thermostats, utilities have experienced demand reductions during load control events. More complete results will be available in 2014 and 2015.

A Dynamic Pricing Project funded in part by a State Energy Plan Grant began in March 2010, and helped develop time-of-use rates for three municipal utilities. A rate analysis showed that one utility did not get sufficient time-of-use price signals from its power supplier to allow meaningful differences in peak and off-peak prices. Currently, two Iowa utilities have approved time-of-use rates set to be implemented in 2014.

In 2004, Sumner Municipal Light Plant implemented time-of-use pricing on a voluntary basis. Thirty of the utility's 1,100 customers are currently on that rate. A majority of residential customers in the trial have shifted their consumption of electricity so that at least 75 percent is at the off-peak rate of 3.5 cents/kWh. IAMU has received only limited information about Sumner's rates at this time. IAMU will be utilizing Sumner's data to help in the design of dynamic or time-of-use rates.

IAMU is collecting information about the cost of energy production, transmission, distribution, and market prices. The information is being used to help determine appropriate rate structures. IAMU is planning to collect consumer data to signify a change of behavior related to rates. Midcontinent Independent System Operator (MISO) nodal pricing is used to develop recommendations for four-part, seasonally adjusted prices: on-peak, off-peak, off-off peak, and critical peak pricing.

IAMU sent out a survey to 136 municipal electric utilities in the week preceding this filing. IAMU received 71 responses. Of those, 53 indicated that they had not installed smart grid technology. Half of the other 18 responded that they had installed automated meter reading (AMR) technology. Many AMR meters are smart-grid ready, so utilities making these installations may be doing so as part of a plan to add two-way communications at a later date. The utilities with AMI programs are:

- Pocahontas
- Spencer
- Muscatine

Utilities planning to install AMI are:

- Webster City
- Sergeant Bluff
- Lake View
- Mount Pleasant
- Sanborn



- La Porte

The following utilities have installed AMR technology. Whether these systems are upgradable to perform smart grid functions is unknown.

- Wilton
- Story City
- City of West Liberty
- Villisca
- Gowrie
- Montezuma
- State Center
- Afton, and
- City of Walker Water Department.

IAMU concludes that using smart grid technology to reduce peak demand through time-of-use pricing makes sense. For MISO Iowa Zone, the 2014 cost of new generation entry is \$58.75 per kW-month while the cost of avoiding a kW of peak demand is using the smart thermostats (2 Degrees to Save) ranged from less than \$10/kW-month to as little as \$3/kW-month, depending on the number of devices deployed. Also, IAMU believes that time-of-use pricing will be effective and much lower in cost than new generation. Smart grid technology is a cost-effective investment. AMI deployment is also contributing towards outage prevention. This has led to increased deployment by one SGIG participant.

### **Iowa Association of Electric Cooperatives (IAEC)**

The October 18, 2013, Board order required an update of the meter replacement program due to installation of AMI at various rural electric cooperatives (cooperatives). Ten cooperatives filed meter testing waiver requests with the Board to implement their AMI project. The following is an update of cooperatives' meter upgrade programs:

1. Maquoketa Valley Electric Cooperative (Docket No. WRU-07-41-943, Order issued February 1, 2008). The cooperative planned to replace all 15,698 of its meters.
2. Eastern Iowa Light & Power Cooperative (Docket No. WRU-08-9-920, Order issued June 2, 2008). During the three year period following the filing, the cooperative intended to replace all of its electric meters (over 25,000) at a rate of approximately 8,500 meters per year.
3. Heartland Power Cooperative (Docket No. WRU-08-92-912, Order issued July 1, 2008). The cooperative planned to replace approximately 6,200 meters on its system over a period of three years.

4. Southwest Iowa Rural Electric Cooperative (Docket No. WRU-08-36-900, Order issued November 4, 2008). The Cooperative would be replacing approximately 6,000 meters on its system over a period of two years.
5. Allamakee-Clayton Electric Cooperative, Inc. (Docket No. WRU-08-50-901, Order issued January 28, 2009). The cooperative planned to replace approximately 9,550 meters on its system over a period of six years.
6. Prairie Energy Cooperative (Docket No. WRU-2010-0012-0932, Order issued October 15, 2010). The cooperative planned to replace all meters on its system over a period of 1 year. The cooperative has replaced 5,050 meters. The new meters are retrieving kWh usage, kW demand, outage information, and voltage. The data is recorded in 60-minute intervals and is transmitted to the cooperative once every 24 hours using power line carrier communications technology.
7. Calhoun County Electric Cooperative Association (Docket No. WRU-2010-0013-0910, Order issued November 8, 2010). The cooperative planned to replace approximately 2,055 meters on its system over a period of three years.
8. Clarke Electric Cooperative, Inc. (Docket No. WRU-2011-0916, Order issued May 16, 2011). The cooperative planned to replace approximately 6,100 meters on its system over a period of two years. The replacement has been completed. The data is recorded at the meter in daily intervals and is transmitted to the cooperative every 24 hours; however, the meters can be read in real time also. The new meters are retrieving kWh usage; kW demand; blink counts; voltage (high/low); and time-of-use for four polyphase meters
9. Butler County Rural Electric Cooperative (Docket No. WRU-2011-0019-0908, Order issued October 13, 2011). The cooperative plans to replace approximately 6,530 meters on its system over a period of five years.
10. Humboldt County Rural Electric Cooperative (Humboldt) (Docket No. WRU-2011-0022-0936, Pending). The cooperative planned to replace approximately 2,300 meters on its system over a period of 2 years. Humboldt merged with Midland Power Cooperative effective January 1, 2013. A total of 2,095 meters have been replaced and the new meters are retrieving kWh usage, kW demand, voltage, and outage detection/restoration information. The data is recorded in 60-minute intervals and is transmitted to the cooperative once every 24 hours using power line carrier communications technology.

Other members of the IAEC have also been working on meter upgrade efforts, even though they may not have requested a waiver from the Board. The distribution electric cooperatives that are members of IAEC serve about 210,000 electric meters in Iowa. Of these meters, approximately 18 percent are AMR and another 60 percent are AMI. This brings the total AMR/AMI meters for these cooperatives to 78 percent. This data is from year end 2012 data as filed with the federal government.

IAEC began an effort, after the 2007 Iowa ice storm, of providing policy makers, the media and other stakeholder information through a Web-based outage map. The map allows users to view the outage data either by county or by individual electric cooperative. This tool became live in the last quarter of 2008. Initially, the data was manually populated by the cooperatives. The IAEC developed a process of notifying the cooperatives when they could begin populating data on a manual basis based on criteria from the Board rules and from events considered significant by the media. Another feature which has been built into the Web-based tool allows the cooperatives the option of providing information about outages pursuant to Iowa Administrative Code 199-20.19 through the Web-based tool. The IAEC, in the last quarter of 2010, worked with an initial group of cooperatives and the National Information Solutions Cooperative (NISC) to allow for the population of the data into the map through electronic data exported from outage management systems. NISC is an information technology company that develops and supports software and hardware solutions primarily for cooperatives and telecommunications companies across the nation. Additionally, the IAEC has worked with other organizations which support cooperatives such as Star Energy and Milsoft Utility Solutions to integrate the outage data into the IAEC outage map on an automated electronic basis. Currently, 50 percent of the meters served by IAEC membership are providing data on an automated basis into the IAEC outage map. The next phase of the project is expected to take meter count to nearly two-thirds of the meters served by cooperatives. After a summer of 2013 modification, the Web-based outage map now includes a Google based map with the capability of displaying a weather overlay. Several other states across the country have either starting using this type of an approach or are exploring the possibility of using such. This map can be viewed at: <https://www.iowarec.org/outages/>.